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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/788,365	02/21/2001	Tuqiang Ni	015290-517	3359

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EXAMINER	
ZERVIGON, RUDY	
ART UNIT	**PAPER NUMBER**
1792	
MAIL DATE	**DELIVERY MODE**
11/14/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/788,365	NI ET AL.	
	Examiner	Art Unit	
	Rudy Zervigon	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *25 and 28-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *25 and 28-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. In view of the Appeal Brief filed on April 6, 2007, PROSECUTION IS HEREBY REOPENED. A new groud of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

PARVIZ HASSANZADEH
SUPERVISORY PATENT EXAMINER

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 25, and 28-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koshimizu; Chishio (US 5,935,373 A) in view of Namose; Isamu (US 5200016 A). Koshimizu teaches a gas injector (156; Figure 1) for supplying process gas to a plasma processing chamber (102; Figure 1) wherein a semiconductor substrate ("W"; Figure 1) is subjected to plasma

processing, the gas injector (156; Figure 1) sized to extend through a chamber wall (108; Figure 1) of the processing chamber (102; Figure 1) such that a planar axial distal end (bottom portion of 156; Figure 1) surface of the gas injector (156; Figure 1) body is exposed within the processing chamber (102; Figure 1) – claim 25

Koshimizu further teaches:

i. The gas injector (156; Figure 1) of Claim 25, wherein the gas injector (156; Figure 1) includes a planar axial end face (bottom portion of 156; Figure 1) which is dimensioned so as to be flush with an interior surface of a dielectric window (108; Figure 1) forming the chamber wall (108; Figure 1), as claimed by claim 29

ii. The gas injector (156; Figure 1) of Claim 25, wherein the gas injector (156; Figure 1) body includes a surface (top surface of 156; Figure 1) adapted to overlie an outer surface (top of 108) of the chamber (102; Figure 1), as claimed by claim 33

iii. The gas injector (156; Figure 1) of Claim 25, wherein the gas injector (156; Figure 1) body includes an annular flange (top surface of 156; Figure 1) having a surface (surface outside of chamber at 156/108 interface; Figure 1) adapted to overlie and contact an outer surface (top of 108) of the chamber wall (108; Figure 1), as claimed by claim 34

iv. The gas injector (156; Figure 1) of Claim 25, wherein the distal end (bottom portion of 156; Figure 1) of the gas injector (156; Figure 1) body is substantially planar, as claimed by claim 37

v. A gas injector (156; Figure 1) for supplying process gas to a plasma processing chamber (102; Figure 1) wherein a semiconductor substrate ("W"; Figure 1) is subjected to plasma processing, the gas injector (156; Figure 1) comprising: gas injector (156; Figure 1) body

sized to extend through a chamber wall (108; Figure 1) of the processing chamber (102; Figure 1) such that an axial distal end (bottom portion of 156; Figure 1) surface of the gas injector (156; Figure 1) body is exposed within the processing chamber (102; Figure 1) – claim 39

vi. a cylindrical bore adapted to supply gas to the gas outlet, the cylindrical bore being defined by a sidewall and an endwall which extends radially inwardly from the sidewall – claim 39

vii. an annular flange (top surface of 156; Figure 1) adapted to overlie and contact an outer surface of the chamber wall (108; Figure 1) – claim 39

viii. A gas injector (156; Figure 1) for supplying process gas to a plasma processing chamber (102; Figure 1) wherein a semiconductor substrate ("W"; Figure 1) is subjected to plasma processing, the gas injector (156; Figure 1) comprising: a gas injector (156; Figure 1) body sized to extend through a chamber wall (108; Figure 1) of the processing chamber (102; Figure 1) such that an axial distal end (bottom portion of 156; Figure 1) surface of the gas injector (156; Figure 1) body is exposed within the processing chamber (102; Figure 1) – claim 41

ix. wherein the gas injector (156; Figure 1) body includes a uniform diameter central bore adapted to supply gas to the gas outlet, the central bore extending axially from an upper axial end face (bottom portion of 156; Figure 1) of the gas injector (156; Figure 1) body, the central bore being defined by a cylindrical sidewall and a flat circular, planar endwall extending between the cylindrical sidewall, inlets of the gas outlets being located on the planar endwall – claim 41

Koshimizu does not teach:

i. the gas injector (156; Figure 1) comprising gas injector (156; Figure 1) body of dielectric material – claim 25

ii. the gas injector (156; Figure 1) body including a plurality of gas outlets adapted to supply process gas into the processing chamber (102; Figure 1), wherein the gas outlets are located in the planar axial distal end (bottom portion of 156; Figure 1) surface of the gas injector (156; Figure 1) body and the gas outlets are sized to inject the process gas at a subsonic, sonic or supersonic velocity - claim 25

iii. The gas injector (156; Figure 1) of Claim 25, the gas outlets include a center gas outlet extending in the axial direction and a plurality of angled gas outlets extending at an acute angle to the axial direction, as claimed by claim 28

iv. The gas injector (156; Figure 1) of Claim 29, wherein the gas injector (156; Figure 1) includes at least one seal adapted to contact the dielectric window (108; Figure 1) when the gas injector (156; Figure 1) is mounted in the dielectric window (108; Figure 1), as claimed by claim 30

v. The gas injector (156; Figure 1) of Claim 25, wherein the gas outlets include a plurality of angled gas outlets which inject process gas at an acute angle relative to a plane parallel to the distal end (bottom portion of 156; Figure 1) surface, as claimed by claim 31

vi. The gas injector (156; Figure 1) of Claim 25, wherein the gas injector (156; Figure 1) is adapted to be removably mounted in an opening in the chamber wall (108; Figure 1) and includes at least one O-ring providing a vacuum seal between the gas injector (156; Figure 1) and the chamber wall (108; Figure 1),as claimed by claim 32

vii. The gas injector (156; Figure 1) of Claim 25, wherein the gas injector (156; Figure 1) body includes at least one O-ring seal on an outer surface of the gas injector (156; Figure 1) body, as claimed by claim 35

viii. The gas injector (156; Figure 1) of Claim 25, wherein the gas injector (156; Figure 1) body includes a first O-ring seal on an outer surface of the gas injector (156; Figure 1) body and a second O-ring seal in a surface of a flange extending from the outer surface of the gas injector (156; Figure 1) body, as claimed by claim 36

ix. The gas injector (156; Figure 1) of Claim 25, wherein all of the gas outlets supply process gas through the distal end (bottom portion of 156; Figure 1) of the gas injector (156; Figure 1) body, as claimed by claim 38

x. the gas injector (156; Figure 1) body including a plurality of gas outlets adapted to supply process gas into the processing chamber (102; Figure 1) and a cylindrical bore adapted to supply gas to the gas outlets, the cylindrical bore being defined by a sidewall and an endwall which extends radially inwardly from the sidewall, the gas outlets including a center gas outlet extending from the endwall in the axial direction and a plurality of angled gas outlets extending from the endwall at an acute angle to the axial direction, wherein the gas outlets are located in the axial distal end (bottom portion of 156; Figure 1) surface of the gas injector (156; Figure 1) body; an annular flange (top surface of 156; Figure 1) adapted to overlie and contact an outer surface of the chamber wall (108; Figure 1) ; and a first O-ring in a surface of the flange for sealing against the outer surface of the chamber wall (108; Figure 1) – claim 39

xi. The gas injector (156; Figure 1) of Claim 39, comprising a second O-ring seal on an outer surface of the gas injector (156; Figure 1) body, as claimed by claim 40

xii. the gas injector (156; Figure 1) body including a plurality of gas outlets adapted to supply process gas into the processing chamber (102; Figure 1), wherein the gas outlets are located in the axial distal end (bottom portion of 156; Figure 1) surface of the gas injector (156; Figure 1) body and the gas outlets being sized to inject the process gas at a subsonic, sonic or supersonic velocity – claim 41

xiii. A gas injector (156; Figure 1) for supplying process gas to a plasma processing chamber (102; Figure 1) wherein a semiconductor substrate ("W"; Figure 1) is subjected to plasma processing, the gas injector (156; Figure 1) comprising a gas injector (156; Figure 1) body made of a dielectric material selected from the group consisting of quartz, alumina and silicon nitride and sized to extend through a chamber wall (108; Figure 1) of the processing chamber (102; Figure 1) such that a planar axial distal end (bottom portion of 156; Figure 1) surface of the gas injector (156; Figure 1) body is exposed within the processing chamber (102; Figure 1), the gas injector (156; Figure 1) body including a plurality of gas outlets adapted to supply process gas into the processing chamber (102; Figure 1), wherein the gas outlets are located in the planar axial distal end (bottom portion of 156; Figure 1) surface of the gas injector (156; Figure 1) body and the gas outlets being sized to inject the process gas at a subsonic, sonic or supersonic velocity, as claimed by claim 42

xiv. The gas injector (156; Figure 1) of Claim 28, wherein the gas injector (156; Figure 1) body includes 8 of the angled gas outlets, as claimed by claim 43

xv. The gas injector (156; Figure 1) of Claim 28, wherein the acute angle is 10 to 70°, as claimed by claim 44

xvi. The gas injector (156; Figure 1) of Claim 28, wherein the angled gas outlets direct the process gas such that the process gas does not flow directly towards a substrate ("W"; Figure 1) being processed, as claimed by claim 45

Namose teaches a semiconductor manufacturing apparatus (Figures 1-3) including plural, angled, outlets (5; Figure 2,3).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the dimensions of Koshimizu's gas injector outlets as taught by Namose, made from process compliant materials and sealed for hemiticity.

Motivation to optimize the dimensions of Koshimizu's gas injector outlets as taught by Namose, is for processing uniformity Namose (column 3; lines 15-38) and for insulating from Koshimizu's conductive coils as taught by Koshimizu (column 3; lines 40-59).

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1792 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

11/13/7